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Appendix A4

Augment Funds for Implementing Marine Protected Areas in California

A4.1 GOALS AND NEXUS TO INJURY

The goal of this action is to improve fish habitat function in Southern California by augmenting the funds needed to evaluate and implement Marine Protected Areas as part of an ecosystem-based management approach for fishery resources. The primary focus of this action will be to provide needed funds for the implementation of the recently established Channel Islands network of Marine Protected Areas (MPAs) to ensure that they provide the best possible basis for further implementations of MPA networks throughout California. Although this action provides specific benefits to fish habitats adjacent to the Northern Channel Islands, the action will also provide longer-term benefits for fish habitats and fishing throughout California by helping to generate sound empirical underpinnings for the site and design of future networks of MPAs. The recently established network of MPAs in the Channel Islands are currently the most appropriate area to direct such effort because they were specifically designed to evaluate the utility of using MPAs as a management tool. If mainland coastal MPA networks are established in the future, the Natural Resource Trustees for the Montrose case (Trustees) will consider directing additional funds to their implementation and/or evaluation during the next phase of restoration, particularly if the MPAs are established in Southern California.

There is growing recognition within California and throughout the world that existing fishing management practices should be expanded to include new methods that utilize an ecosystem approach. The Channel Islands network of MPAs was created in 2002 as a first step in implementing a California-wide network of MPAs as required by the California Marine Life Protection Act (MLPA) initiative. Collection of fish and other biota is prohibited in 10 of the 12 MPAs in this network and restricted in the remaining two MPAs. These protected areas enable fish to grow larger and have higher fecundity, leading to higher abundances within the MPA, and potentially to improvements in fish catches outside of the MPA. These “spillover” effects of MPAs are subject to an ongoing debate among scientists, managers, and commercial and recreational fishing interests. As a result, the degree to which commercial and recreational fishing interests are assured that MPAs networks result in a net increase catches will directly impact the level of resistance that the future implementation of these networks will receive.

This restoration action is considered to have a moderate relationship to the lost fishing services of the Montrose case because of the distance of the Channel Islands MPAs from areas with fishing advisories. However, MPAs may be areas of higher fish abundance, which may benefit eagles foraging along the coastlines of the Channel Islands. An evaluation of diet-based sources of DDTs to eagles demonstrated that even though fish constituted approximately 79 percent of the diet of bald eagles, only 8 percent of there total body burden of DDTs came from fish. Marine mammal tissue (principally sea lions) constituted approximately 5.8 percent of their diet, but contributed to approximately 59 percent of the eagles’ body burden of DDTs (Glaser and Connolly 2002). If fish abundances within and around the MPAs are sufficiently high to shift eagle foraging habits such that a larger proportion of their diet consists of fish rather than marine mammal carcasses, the possibility of the eagles producing viable eggs may be improved. Similarly, successfully implemented MPAs in the Channel Islands may also provide less disturbed foraging habitat with higher abundances of prey for seabirds that were impacted by DDTs.

This action has the highest nexus to injured fish habitats. Given that specific fish habitats (Palos Verdes Shelf sediments) are injured in a way that makes direct restoration difficult, this action is considered to be compensatory for the lost habitat function of the Palos Verdes Shelf. Further, if the Channel Islands MPAs are managed effectively and monitoring demonstrates improvements to adjacent fisheries, the use of MPAs as a management tool may be expanded by state and federal regulatory agencies to other areas along the California coast and eventually benefit anglers closer to the area impacted by Montrose-related contaminants.

A4.2 BACKGROUND

MPAs are sections of the ocean set aside to protect and restore habitats and ecosystems, conserve biological diversity, provide a sanctuary for sea life, enhance recreational and educational opportunities, provide a reference point against which scientists can measure changes elsewhere in the environment, and help rebuild depleted fisheries (McArdle 1997). Although MPAs may be established by federal, state, or local agencies, this action focuses on those established by the State of California, primarily because these are specifically designed to act as a stimulant of fish production and thereby create a more sustainable approach to fisheries management. The State of California is the primary agency involved in evaluating the effectiveness of the Channel Islands MPAs in increasing the abundances of fish beyond their borders.

The MPA concept spans a broad range of resource management options, ranging from limited to full protection. The State of California MPA classifications include:

- Marine Reserves: Also called no-take reserves, marine reserves prohibit all take of living, geological, or cultural resources.
- Marine Conservation Areas: Prohibit specific commercial and/or recreational take of resources on a case-by-case basis.
- Marine Parks: Prohibit commercial take but allow recreational fishing, though some restrictions may apply.

The wide variation in levels of protection and effectiveness of enforcement among the current array of MPAs in California creates “an illusion of protection while falling far short of its potential to protect living marine life and its habitat” (California Fish and Game Code, Section 2851). Prior to the establishment of the Channel Islands MPA network, only 14 of the 220,000 square miles of combined federal and state waters of California were set aside as genuine no-take reserves.

The Channel Islands MPA network was approved by the California Fish and Game Commission in 2002 and established by formal legislative rule in April 2003. The network consists of 12 MPAs covering 142 square nautical miles (487 square kilometers) (Figure 4A-1). Ten of the 12 MPAs (132 square nautical miles [453 square kilometers]) are no-take marine reserves, and the remaining two are marine conservation areas, which allow for limited recreational fishing and commercial lobster trapping. Thus, the establishment of the Channel Islands MPA network significantly expanded the total amount of area set aside as no-take marine reserves in California marine waters.

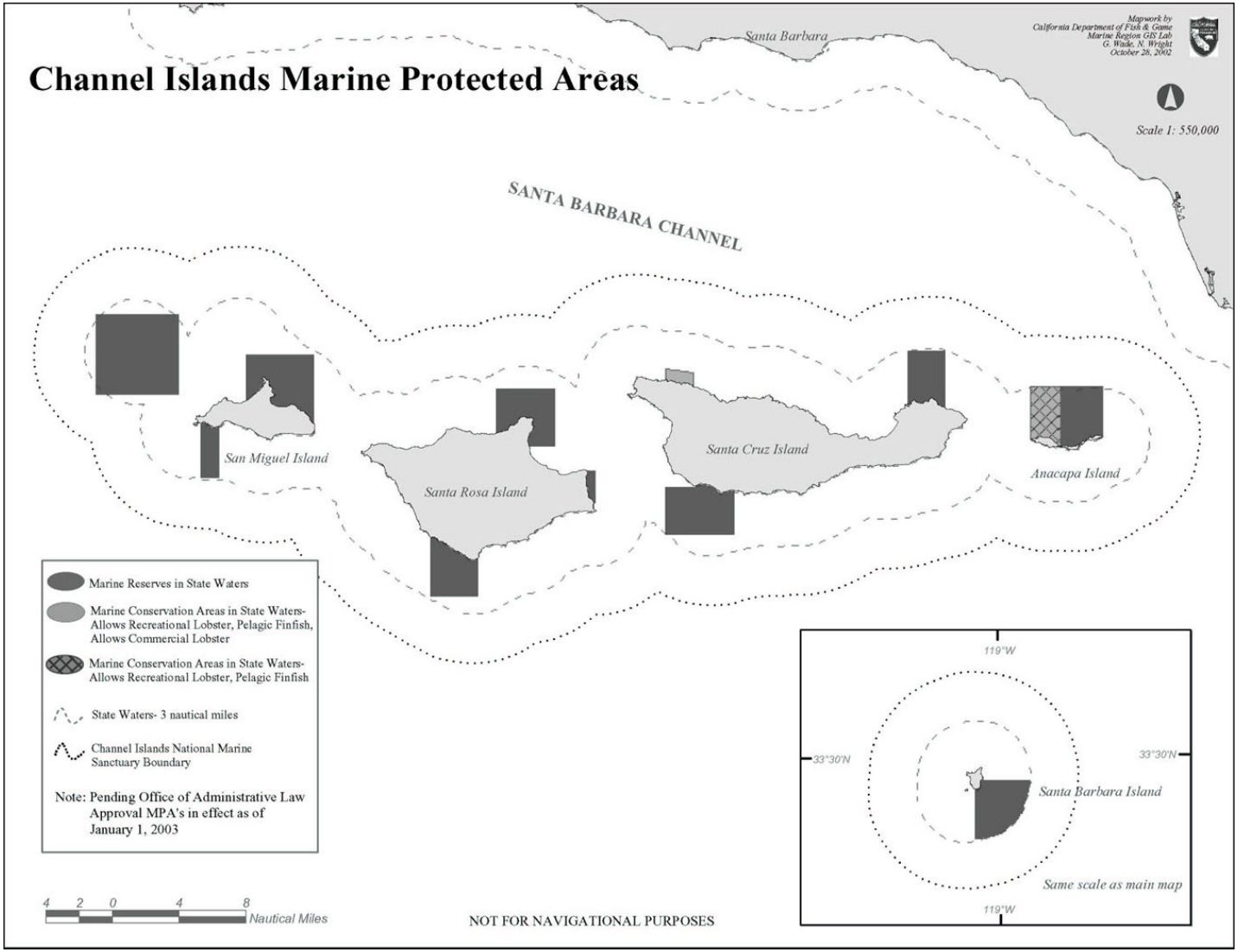

Figure A4-1. The Channel Islands network of Marine Protected Areas.

Several other MPAs exist in the Southern California Bight (a list may be found at www.dfg.ca.gov/mrd/mlpa/mpa.html). None of the other MPAs are as broad or comprehensive in scope as the Channel Islands MPAs, and most are designated as state marine parks rather than no-take reserves. Two marine parks, Abalone Cove State Marine Park and Point Fermin State Marine Park, are located in the Palos Verdes Shelf coastal region, an area associated with the most restrictive fishing advisories related to the Montrose case. The Point Fermin park serves primarily to prohibit the collection of invertebrates and does not restrict fin fishing; the Abalone Cove park imposes only limited restrictions pertaining to mode of fishing and does not regulate the species or quantity of fish caught. Neither of these sites has a management objective of enhancing fisheries outside of its boundaries.

Concurrent with the establishment of the Channel Islands MPAs is an expansion in the efforts to examine and reinvigorate ocean resource management in the United States and throughout the world in response to indicators of concern (e.g., depleted fish populations, lost nursery habitat, polluted coastal zones, or contaminated fish). At the national level, the Pew Oceans Commission published its findings and action recommendations in 2003, declaring that the oceans of the nation are in crisis (Pew Oceans Commission 2003). In September 2004, the U.S. Commission on Ocean Policy released its findings and recommendations for a new, coordinated, and comprehensive national ocean policy (U.S. Commission on Ocean Policy 2004). In 1999, the California State Legislature found that the marine habitat and biological diversity of the state's ocean waters were threatened by coastal development, water pollution, and other human activities and passed the MLPA. The MLPA mandates that the state design and manage an improved network of MPAs to, among other things, protect marine life and habitats, marine ecosystems, and marine natural heritage.

Under the MLPA, the state is required to develop a master plan for the integrated management of existing and new marine reserves for the entire state. The development of the MLPA master plan was placed on hold by the State of California in January 2004 due to lack of funding, but the program was revitalized later in 2004 through a combination of public and private funding. The evaluation of the Channel Islands MPAs has continued via collaboration between the California Department of Fish and Game (CDFG), the National Park Service (NPS), the National Oceanic and Atmospheric Administration (NOAA) National Marine Sanctuaries Program, and various universities. However, many components of the evaluation are currently operating with insufficient levels of funding (Table A4-1).

The success of an MPA, and therefore the degree to which information from it can be used to guide future MPAs, is strongly influenced by the effectiveness of its implementation. Insufficient financial and technical resources, lack of staff, or lack of data for management decisions can reduce the effectiveness of an MPA. Monitoring, public education, and enforcement play critical roles in providing for and demonstrating the long-term positive impacts of MPAs on biodiversity and the human communities that depend on these resources. (NOAA 2005a).

Monitoring programs for the Channel Islands MPAs provide information that is central to understanding the effectiveness of MPAs as a management tool for restoring depleted marine resources and sustainable fishing services. Biological monitoring of these MPAs includes a range of activities, is conducted by several groups and agencies (including NPS, CDFG, the

Partnership for Interdisciplinary Studies of Coastal Oceans [PISCO], University of California, Santa Barbara, and others), and is typically incompletely funded (Table A4-1). CDFG oversees

Table A4-1
Summary of Activities Associated with Monitoring, Evaluating, and Enforcing the Channel Islands MPAs

Agency	Progam	Annual Cost	Years	Total Cost (2005-2008)	Secured[3]	Funding Needs
CDFG[1]	**SCUBA Surveys**	N/A - $500,000	4	N/A - $2,000,000	$800,000	N/A - $1,200,000
	Groundfish tagging	N/A - $150,000	4	N/A - $600,000	$115,000	N/A - $485,000
	Trap/Fixed Gear Surveys	$100,000 - $300,000	4	$400,000 - $1,200,000	$0	$400,000 - $1,200,000
	Newly Settled Fish Surveys	N/A - $100,000	3	N/A - $300,000	$75,000	N/A - $225,000
	Aerial Monitoring of Kelp Canopy	N/A - $100,000	4	N/A - $400,000	$400,000	N/A - $0
	ROV Surveys	$150,000 - $200,000	4	$600,000 - $800,000	$40,000	$560,000 - $760,000
	Submersible Surveys	$60,000 - $100,000	4	$240,000 - $400,000	$0	$240,000 - $400,000
	Intertidal Monitoring	N/A - $200,000	4	N/A - $800,000	$800,000	N/A - $0
	Social Science Coordinator	$60,000 - $100,000	4	$240,000 - $400,000	$0	$240,000 - $400,000
	Social Science Surveys[4]	$325,000 - $500,000	4	$1,300,000 - $2,000,000	$600,000	$700,000 - $1,400,000
	Sanctuary Aerial Monitoring and Spatial Analysis Program (SAMSAP)	N/A - $100,000	4	N/A - $400,000	$400,000	N/A - $0
	Public Outreach	N/A - $50,000	4	N/A - $200,000	$200,000	N/A - $0
	Enforcement[5]	TBD	4	TBD	TBD	TBD
NPS	**Kelp Forest Monitoring Survey**	N/A - $280,000	4	N/A - $1,120,000	$920,000	N/A $200,000
	MPA evaluation/extention of	N/A - variable[2]	4	N/A - $904,711	$564,711	N/A $340,000
	Enforcement	$526,000	4	$2,104,000	$800,000	$1,304,000
Total[5]				$13,628,711		$7,914,000

[1] CDFG costs are estimates and some programs may vary in costs among years so a range of annual costs for these programs is presented.

[2] National Parks Service MPA project includes higher costs in the first two years due to the increased costs associated with setting up sites. Once sites are set up maintenance/monitoring costs are ~$170,000/year.

[3]Secured funding based on an assumption that current funding levels are maintained.

[4]Social science surveys includes knowledge perceptions and attitudes surveys as well as analysis of DFG commercial and recreational fisheries data.

[5]Total costs are based on maximun cost estimates only and should therefore be viewed as a "worst-case" scenario.

[5]TBD = To Be Determined

the evaluation of the MPAs. The goals of these monitoring programs are as diverse as the programs themselves, but the biological monitoring is primarily focused on evaluating productivity inside and outside the MPAs and the degree to which productivity (primarily in terms of fish biomass, eggs, or larvae) "spills over" into adjacent unprotected areas.

A4.3 PROJECT DESCRIPTION AND METHODS

The management and monitoring of the Channel Islands MPAs is a large effort involving state and federal agencies, academic institutions, and non-governmental organizations. Each component of this multi-faceted approach operates on different levels of funding with different funding sources. In examining the MPA concept as a potential means of restoring fish and their habitats in the Southern California Bight, the Trustees identified four specific actions for which Montrose Settlements Restoration Program (MSRP) funds could contribute to more effective implementation of the Channel Islands MPAs:

1. Subtidal fish monitoring: Much of the work associated with the Channel Islands MPA evaluation is labor intensive field work that requires significant training and knowledge of the biota. Over a 5-year period, MSRP could fund the salary of a technician working

for one of the existing MPA implementation groups (i.e., NPS, PISCO, or CDFG) during the field season to address key funding gaps in specific monitoring programs. This action will, for instance, improve the reliability of data collected to evaluate the spillover benefits of MPAs on adjacent fisheries.

2. NPS/CDFG enforcement: Inadequate enforcement of MPA restrictions on taking biota from the reserves would undermine the validity of the assessment of how well the MPA achieves its objectives. If the MPAs do not in fact function as a refuge from fishing due to lack of enforcement, the results of the MPA evaluation would not represent a protected area and would therefore not be an evaluation of the utility of MPAs as a management tool.

3. Support for CDFG ROV Surveys: Beyond the scuba-based survey work, CDFG also conducts regular remotely operated vehicle (ROV) surveys in the deeper regions of the reserve that are not easily monitored using scuba surveys. The CDFG boat that is available for these surveys is not adequately rigged to conduct these surveys, and other boats must be contracted to do the work (Ugoretz, pers. comm., 2004), leading to logistic constraints and higher operating costs.

4. Expansion of the groundfish tagging project: Through a private contractor, CDFG has been conducting a tagging program that specifically examines the abundance and movements of selected groundfish species inside and outside of MPAs, including, but not limited to, those that have been established in the Northern Channel Islands (Hanan, pers. comm., 2004). This effort has collateral benefits to commercial fishing boats impacted by fishery closures because the program employs these boats and crews for fish collections. The program also promotes the involvement of anglers over a 5-year period in the MPA evaluation process. Funding for this project was only sufficient to focus primarily on one species group: rockfishes. MSRP could fund this work for two additional years, allowing the techniques and infrastructure to be applied to species that are more directly relevant to MSRP restoration goals (e.g., kelp bass and surfperches). The results of this work would not only be relevant to the ongoing evaluation of the Channel Islands MPAs, but would also be relevant to MSRP artificial reef restoration projects by providing additional insights on the relationship between reef size and ability to sustain fishing pressure.

A4.4 ENVIRONMENTAL BENEFITS AND IMPACTS

A4.4.1 Biological

Benefits

The concept of using MPAs as a management tool is grounded in the concept that MPAs would be established in “source” habitats where the local population is protected and produces maximal numbers of eggs, larvae, and adults. This production would “refuel” areas depleted by fishing via spillover of adults and direct recruitment of juveniles, allowing for higher levels of fishing mortality than would be possible without the protected regions.

MPAs have been shown to increase fish abundance outside their boundaries via increased production of eggs by bigger, more abundant fish within the MPA and the spillover of fish from the MPA (e.g., Roberts et al. 2001). This effect is still much debated with no clear consensus in the literature (Willis et al. 2003). It is likely that the potential for spillover effects is system- and species-dependent and largely due to interspecies differences in often poorly understood life history parameters (e.g., larval survivorship, fecundity, home range, mobility, and size and age at reproduction) that affect the impacts of MPAs on abundance of fish outside their borders (Botsford et al. 2003, McClanahan and Mangi 2000). Recent work investigating maternal effects on offspring viability in rockfishes has shown that protecting larger older individuals in a population is an important component of the maintenance of a healthy population (Berkley et al. 2004a, 2004b). This work also suggests that many of the west coast groundfishes that are currently considered to be overfished are particularly sensitive to the loss of large, old individuals. The value of MPAs is that they present a solution to the problem of the loss of larger, older fish that typically occurs under conventional management strategies.

A fish population that consists of a diverse age/size distribution will likely spawn over a broader spawning period, with younger individuals spawning at different times than older individuals (Kjesbu et al. 1996). A broader spawning period can result in an increased potential for larvae to encounter conditions favorable for recruitment. Much of this work, however, is based on life-history-specific examinations, and to date there is a lack of comprehensive studies that examine the population-level impacts of these processes. The evaluation of the Northern Channel Islands MPAs may provide at least regional, if not population-level, data that will test the hypotheses that have been established based on the examination of specific life stages.

Although the impact of MPAs on surrounding fisheries is still a subject of debate, a growing body of literature has demonstrated the positive effects of MPAs on the size and abundance of fish and invertebrates within their boundaries (summarized in Halpern 2003). Although this effect by itself does not provide for additional fishing opportunities, it does provide important opportunities to monitor fish communities in a more pristine state. These opportunities are critical to pre-empt the tendency to allow ecological baselines to slide as marine resources become depleted (Dayton et al. 1998). These opportunities also provide chances for marine ecologists to investigate biological interactions in marine communities that are not impacted by fishing mortality, enabling a more clear separation of natural shifts in ecosystem processes (El Nińo, current regimes, etc.) and the impacts of fishing. Although these benefits do not directly result in increases in fishing opportunities, they relate directly to the process of improving the standards and methods with which fishery resources are managed.

The benefits of a successful evaluation of the utility of the Channel Islands MPAs as a fishery management tool may extend beyond the Northern Channel Islands if they improve the reliability of determinations of MPA effectiveness as a fishery management tool. Conventional resource management strategies are often ineffective for sustaining marine fisheries, and several important species commonly caught off the coast of California exhibit life-history characteristics that make them particularly vulnerable to the weaknesses of conventional management approaches (Berkley et al. 2004a, 2004b). Improved management strategies that incorporate the needs of species with vulnerable life history characteristics may be as vital a restoration activity to marine fisheries resources as the creation or restoration of critical habitat.

The Channel Islands MPA monitoring plan (CDFG 2004a) states that some resources may respond to MPAs quickly, whereas others may take many years to respond. The monitoring plan suggests that a major review be conducted 5 years after implementation (in the spring of 2008). The monitoring plan does not suggest that after 5 years there will be sufficient data to determine the outcome of the evaluation, but simply that 5 years will be sufficient time to determine if mid-course or adaptive corrections in the process need to be made. Given this expected time frame, the Trustees consider that a minimum period of involvement of 5 years is required to substantially improve the evaluation of the Northern Channel Islands MPAs.

Impacts

This action has no known biological impacts.

A4.4.2 Physical

Benefits

This action has no known benefits to the physical environment.

Impacts

This action has no known impacts to the physical environment.

A4.4.3 Human Use

Benefits

Several potential benefits to human use could occur from improved effectiveness of the implementation of the Channel Islands MPAs. Restoration of depleted resources within the boundaries of the reserves may provide recreational opportunities outside of the reserves. Although the MPAs generally prohibit the taking of biota within the MPA boundaries, effectively managed MPAs could potentially lead to the spillover of fish to adjacent areas and thus improve fishing uses outside their boundaries. The specific benefits of this action will relate to the design and location of the future MPAs on which the results of this action would be based. Only through a detailed understanding of the ecological value of currently established MPAs can future MPAs be designed that maximize the potential benefits to human use.

Impacts

By their nature, MPAs restrict several types of human uses within their boundaries. This impact was addressed in the environmental documentation that supported the original establishment of the Channel Islands MPAs (CDFG 2002). The most seriously debated impact of the Channel Islands MPAs related to the question of their contribution to commercial and recreational catches. Opponents of these MPAs suggest that even though MPAs may increase the abundance of fish within their boundaries, they exclude fishermen from the most productive fishing areas,

concentrating them in the less productive areas and causing an overall reduction of catch. This issue was addressed during the development of the Channel Islands MPAs through extensive collaboration with the fishing community to avoid restrictions to fishing in already-established, favored fishing locations. In addition, the Channel Islands MPA evaluation plan calls for extensive socioeconomic impact studies designed to address the potential negative impacts of MPAs on human uses (CDFG 2002).

The specific MSRP action proposed here, augmenting funding for existing management and monitoring efforts, does not establish new MPAs and does not modify the boundaries or human use restrictions already established for the Channel Islands MPAs. Thus, potential impacts to human uses are not considered to be significant.

A4.5 LIKELIHOOD OF SUCCESS/FEASIBILITY

The success of this restoration action does not depend on actual monitoring outcomes (e.g., whether these MPAs improve fisheries in adjacent areas), but on whether MSRP contributions improve the validity and reliability of the findings emerging out of MPA implementation and increase the credibility of those findings before the public and affected user groups.

Because this restoration action will entail supplementing current enforcement and monitoring programs already designed and being carried out by CDFG, NPS, and PISCO, the operational feasibility of the action is high. The tagging program has been established and has already developed a working relationship with commercial charter boat captains along the Southern California coast. These agencies have also developed the protocols and initiated outreach to fishermen to increase recapture potential. Thus, the Trustees will not need to fund concept development, only implementation.

It is unlikely that any of the projects described above will encounter significant regulatory hurdles. However, the establishment of MPAs in the Northern Channel Islands has not had universal public support. The objective of this restoration action will be to contribute to enforcement and monitoring efforts that aim to resolve questions about the specific and realized benefits of MPAs.

A4.6 PERFORMANCE CRITERIA AND MONITORING

This action will be nested within the broader scope of the ongoing evaluation of the Northern Channel Islands MPAs being carried out by CDFG, which has developed specific performance criteria (CDFG 2004a). The Trustees will adopt these criteria.

A4.7 EVALUATION

The Trustees have evaluated this restoration action against all screening and evaluation criteria developed to select restoration actions and concluded that this action is consistent with these selection factors. Because the Channel Islands MPAs are distant from the areas affected by the fish consumption advisories related to the Montrose case, this action is not likely to significantly restore the lost human uses (fishing services) related to the case. Also, given the lack of regional data on the spillover of fish to fishing areas adjacent to MPAs, the potential that establishing new

MPAs nearer the Los Angeles coast would restore fishing services is uncertain. Nevertheless, this action will address the MSRP goal of restoring fish and the habitats on which they depend within the Southern California Bight and for this reason has been found to meet the selection factors. Also, the findings that come from improved management and monitoring of the Channel Islands MPAs may ultimately be used to improve fishery resources elsewhere, including the areas more severely impacted by the Montrose contamination.

A4.8 BUDGET

Under this action, MSRP funds will be provided to support MPA implementation in the Northern Channel Islands (Table A4-1). The Trustees propose to provide up to $500,000 toward implementation and evaluation of the Channel Islands MPAs from the $12 million allocated for all fishing and fish habitat restoration actions under the MSRP. The specific projects that will be funded will be determined via a review process that will respond to the dynamic nature of the funding for this program and will therefore seek to avoid duplicating funding for projects and maximize the degree to which funds may be matched with funding from other sources.